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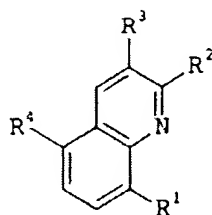


WINSCHEL et al.

Serial No. 09/763,704

COPY OF ALL CLAIMS

1. A cyclohexenonequinolinoyl derivative of the formula I



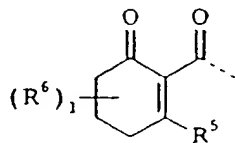
where:

R<sup>1</sup> is hydrogen, nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyiminomethyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, aminosulfonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl, N, N-di-( C<sub>1</sub>-C<sub>6</sub>-alkyl ) aminosulfonyl , N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino, phenoxy, heterocycloxy, phenylthio or heterocyclylthio, where the four last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the following substituents :

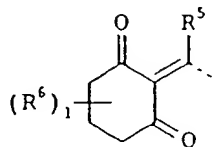
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

$R^2, R^3$  are hydrogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl or halogen;

$R^4$  is a compound IIa or IIb



IIa



IIb

where

$R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SOR^8$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $POR^8R^9$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$ ,  $OPSR^8R^9$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), where the heterocyclyl radical of the two last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

$R^6$  is nitro, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl, di-( $C_1$ - $C_6$ -alkoxy)methyl, di-( $C_1$ - $C_6$ -alkylthio)methyl, ( $C_1$ - $C_6$ -alkoxy)( $C_1$ - $C_6$ -alkylthio)methyl, hydroxyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkoxycarbonyloxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl,  $C_1$ - $C_6$ -haloalkylsulfonyl,  $C_1$ - $C_6$ -alkylcarbonyl,  $C_1$ - $C_6$ -haloalkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl or  $C_1$ - $C_6$ -haloalkoxycarbonyl;

or

two radicals , which are linked to the same carbon,  
together form an  $-O-(CH_2)_m-O-$ ,  $-O-(CH_2)_m-S-$ ,  $-S-(CH_2)_m-S-$ ,  $-O-(CH_2)_n-$  or  $-S-(CH_2)_n-$  chain which may be substituted by  
one to three radicals from the following group:  
halogen, cyano,  $C_1-C_4$ -alkyl,  $C_1-C_4$ -haloalkyl or  $C_1-C_4$ -  
alkoxycarbonyl;

or

two radicals , which are linked to the same carbon,  
together form a  $-(CH_2)_p$  chain which may be interrupted by  
oxygen or sulfur and/or may be substituted by one to four  
radicals from the following group:  
halogen, cyano,  $C_1-C_4$ -alkyl,  $C_1-C_4$ -haloalkyl or  $C_1-C_4$ -  
alkoxycarbonyl;

or

two radicals , which are linked to the same carbon,  
together form a methyldene group which may be substituted by  
one or two radicals from the following group:  
halogen, hydroxyl, formyl, cyano,  $C_1-C_6$ -alkyl,  $C_1-C_6$ -  
haloalkyl,  $C_1-C_6$ -alkoxy,  $C_1-C_6$ -haloalkoxy,  $C_1-C_6$ -alkylthio,  $C_1$ -  
 $C_6$ -haloalkylthio,  $C_1-C_6$ -alkylsulfinyl,  $C_1-C_6$ -haloalkylsulfinyl,  
 $C_1-C_6$ -alkylsulfonyl or  $C_1-C_6$ -haloalkylsulfonyl;

or

two radicals , which are linked to the same carbon,  
together with this carbon form a carbonyl group;

or

two radicals , which are linked to different carbons,  
together form a  $-(CH_2)_n$  chain which may be substituted by  
one to three radicals from the following group:  
halogen,  $C_1-C_6$ -alkyl,  $C_1-C_6$ -alkoxy, hydroxyl or  $C_1-C_6$ -  
alkoxycarbonyl;

$R^7$  is  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  
 $C_3$ - $C_6$ -alkynyl,  $C_3$ - $C_6$ -haloalkynyl,  $C_3$ - $C_6$ -cycloalkyl,  
 $C_1$ - $C_{20}$ -alkylcarbonyl,  $C_2$ - $C_6$ -alkenylcarbonyl,  
 $C_2$ - $C_6$ -alkynylcarbonyl,  $C_3$ - $C_6$ -cycloalkylcarbonyl,  
 $C_1$ - $C_6$ -alkoxycarbonyl,  $C_3$ - $C_6$ -alkenyloxy carbonyl,  
 $C_3$ - $C_6$ -alkynyloxy carbonyl,  
 $(C_1$ - $C_{20}$ -alkylthio)carbonyl,  
 $C_1$ - $C_6$ -alkylaminocarbonyl,  
 $C_3$ - $C_6$ -alkenylaminocarbonyl,  
 $C_3$ - $C_6$ -alkynylaminocarbonyl,  
 $N,N$ -di- $(C_1$ - $C_6$ -alkyl)aminocarbonyl,  
 $N$ -( $C_3$ - $C_6$ -alkenyl)- $N$ -( $C_1$ - $C_6$ -alkyl) aminocarbonyl ,  
 $N$ -( $C_3$ - $C_6$ -alkynyl)- $N$ -( $C_1$ - $C_6$ -alkyl) aminocarbonyl ,  
 $N$ -( $C_1$ - $C_6$ -alkoxy)-  
 $N$ -( $C_1$ - $C_6$ -alkyl) aminocarbonyl ,  $N$ -( $C_3$ - $C_6$ -alkenyl)-  
 $N$ -( $C_1$ - $C_6$ -alkoxy) aminocarbonyl ,  $N$ -( $C_3$ - $C_6$ -alkynyl)-  
 $N$ -( $C_1$ - $C_6$ -alkoxy) aminocarbonyl, di- $(C_1$ - $C_6$ -alkyl)-  
aminothiocarbonyl,  $C_1$ - $C_6$ -alkylcarbonyl- $C_1$ - $C_6$ -alkyl,  
 $C_1$ - $C_6$ -alkoxyimino- $C_1$ - $C_6$ -alkyl,  
 $N$ -( $C_1$ - $C_6$ -alkylamino) imino- $C_1$ - $C_6$ -alkyl or  
 $N,N$ -di- $(C_1$ - $C_6$ -alkylamino)imino- $C_1$ - $C_6$ -alkyl, where  
the above-mentioned alkyl, cycloalkyl and alkoxy radicals may be partially  
or fully halogenated and/or may carry one to three of the following groups:  
cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio, di- $(C_1$ - $C_4$ -alkyl)amino,  
 $C_1$ - $C_4$ -alkylcarbonyl,  $C_1$ - $C_4$ -alkoxycarbonyl,  $C_1$ - $C_4$ -alkoxy- $C_1$ -  
 $C_4$ -alkoxycarbonyl, di- $(C_1$ - $C_4$ -alkyl)amino- $C_1$ - $C_4$ -  
alkoxycarbonyl, hydroxycarbonyl,  $C_1$ - $C_4$ -alkylaminocarbonyl,  
di- $(C_1$ - $C_4$ -alkyl)aminocarbonyl, aminocarbonyl,  $C_1$ - $C_4$ -

alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;  
 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-  
 alkyl, phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclylcarbonyl-C<sub>1</sub>-  
 C<sub>6</sub>-alkyl, phenylcarbonyl, heterocyclylcarbonyl,  
 phenoxy carbonyl, heterocycliloxy carbonyl,  
 phenoxythiocarbonyl, heterocycliloxythiocarbonyl, phenoxy-  
 C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, heterocycliloxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
 phenylaminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-  
 (phenyl)aminocarbonyl, heterocyclylaminocarbonyl, N-(C<sub>1</sub>-  
 C<sub>6</sub>-alkyl)-N-(heterocyclyl)aminocarbonyl, phenyl-C<sub>2</sub>-C<sub>6</sub>-  
 alkenylcarbonyl or heterocyclyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, where  
 the phenyl and the heterocyclyl radical of the 20 last-  
 mentioned substituents may be partially or fully halogenated  
 and/or may carry one to three of the following radicals:  
 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-halogenalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or  
 C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>8</sup>, R<sup>9</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-  
 alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-  
 alkoxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-haloalkylamino, di-  
 (C<sub>1</sub>-C<sub>6</sub>-alkyl) amino or di-(C<sub>1</sub>-C<sub>6</sub>-haloalkyl) amino, where the  
 abovementioned alkyl, cycloalkyl and alkoxy radicals may be  
 partially or fully halogenated and/or may carry one to three  
 of the following groups:  
 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>- alkyl) amino,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-  
 C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl) amino-C<sub>1</sub>-C<sub>4</sub>-  
 alkoxycarbonyl,  
 hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-  
 alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy

or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenoxy, heterocycloxy, where the phenyl and the heterocyclyl radical of the last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-alkynyloxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonylamino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three radicals from the following group:

cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl or heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the phenyl or heterocyclyl radical of the four last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl;

I is 0 to 6;

m is 2 to 4;

n is 1 to 5;

p is 2 to 5;

and their agriculturally useful salts.

2. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 where

R<sup>1</sup> is halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, heterocycloxy or phenylthio, where the two last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the substituents mentioned below:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>5</sup> is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup>, OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals: nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

3. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>5</sup> is halogen, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals: nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

4. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of the three last-mentioned substituents may be partially or fully halogenated and/or may carry



one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkoxy;

R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl.

5. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>6</sup> is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)-methyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

or

two radicals, which are linked to the same carbon, together form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-, -S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from the following group:

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

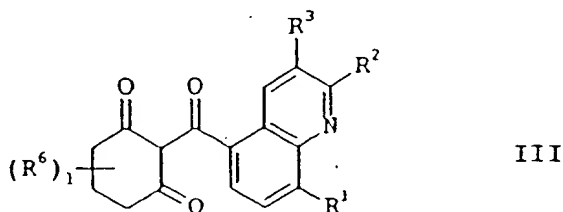
two radicals, which are linked to the same carbon, together form a -(CH<sub>2</sub>)<sub>p</sub> chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the following group:

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

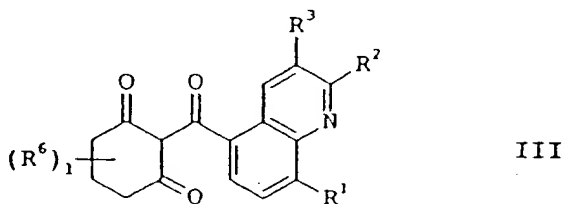
two radicals, which are linked to the same carbon, together with this carbon form a carbonyl group.

6. A process for preparing compounds of the formula I as claimed in claim 1 where  $R^5 = \text{halogen}$ , which comprises reacting a cyclohexanedione derivative of the formula III,

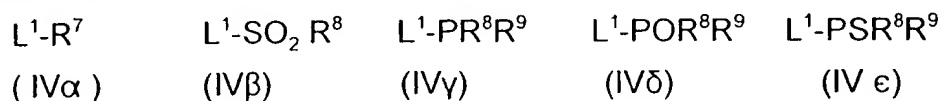


where the variables  $R^1$  to  $R^3$ , and I are each as defined in claim 1, with a halogenating agent.

7. A process for preparing compounds of the formula I as claimed in claim 1 where  $R^5 = OR^7$ ,  $OSO_2R^8$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$  or  $OPSR^8R^9$ , which comprises reacting a cyclohexanedione derivative of the formula III,

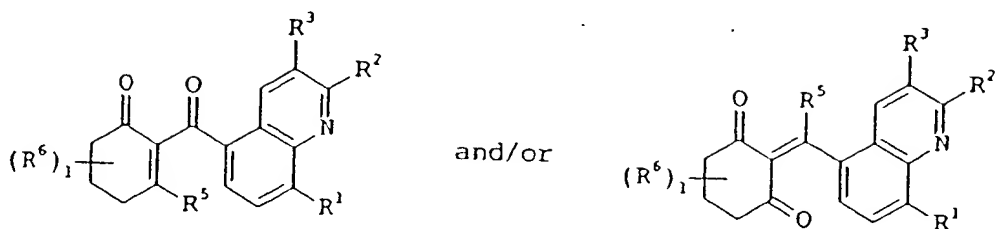


where the variables  $R^1$  to  $R^3$ , and I are each as defined in claim 1, with a compound of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\epsilon$ ,



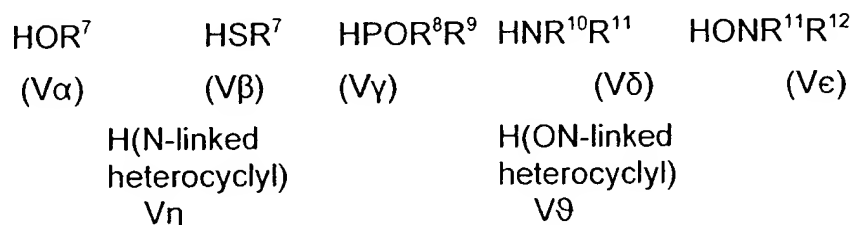
where the variables  $R^7$  to  $R^9$  are each as defined in claim 1 and  $L^1$  is a nucleophilically replaceable leaving group.

8. A process for preparing compounds of the formula I as claimed in claim 1 where  $R^5 = OR^7$ ,  $SR^7$ ,  $POR^8R^9$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), which comprises reacting a compound of the formula I  $\alpha$  ( $\equiv$  I where  $R^5 = \text{halogen}$ ,  $OSO_2R^8$ ),



I where  $R^5 = \text{halogen or } \text{OSO}_2R^8$

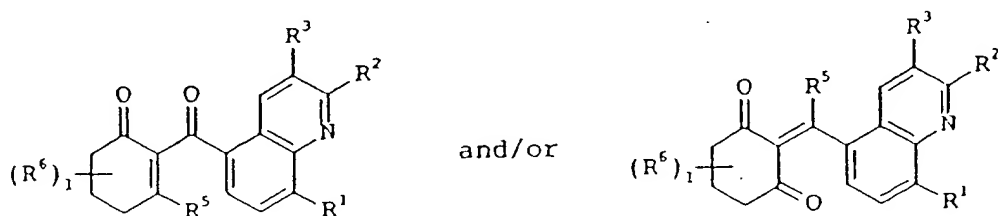
where the variables  $R^1$  to  $R^3$ ,  $R^6$  and I are each as defined in claim 1, with a compound of the formula  $V\alpha, V\beta, V\gamma, V\delta, V\epsilon, V\eta, V\theta$ ,



where the variables  $R^7$  to  $R^{12}$  are each as defined in claim 1, if appropriate

in the presence of a base.

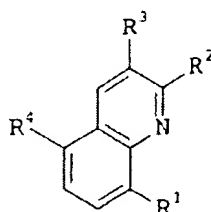
9. A process for preparing compounds of the formula I as claimed in claim 1, where  $R^5 = \text{SOR}^8, \text{SO}_2R^8$ , which comprises reacting a compound of the formula I $\beta$  ( $\equiv$  I where  $R^5 = \text{SR}^8$ ),



I where  $R^5 = \text{SR}^8$

where the variables  $R^1$  to  $R^8$  and I are each as defined in claim 1, with an oxidizing agent.

10. A composition, comprising a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 and auxiliaries which are customarily used for formulating crop protection agents.
11. A process for preparing compositions as claimed in claim 10, which comprises mixing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I and auxiliaries which are customarily used for formulating crop protection agents.
12. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 to act on plants, their habitat and/or on seeds.
13. The use of cyclohexenonequinolinoyl derivatives of the formula I or their agriculturally useful salts as claimed in claim 1 as herbicides.
14. A cyclohexenonequinolinoyl derivative of the formula I



where:

$R^1$  is hydrogen, nitro, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxyiminomethyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -

haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, aminosulfonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl,

N, N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl) aminosulfonyl,

N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino,

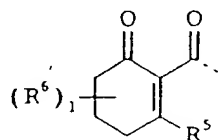
phenoxy, heterocycloxy, phenylthio or heterocyclylthio, where the four last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the following substituents :

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl,

C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>2</sup>, R<sup>3</sup> are hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl or halogen;

R<sup>4</sup> is a compound IIa



IIa

where

R<sup>5</sup> is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, OSO<sub>2</sub>R<sup>8</sup>, POR<sup>8</sup>R<sup>9</sup>,

OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup>, OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup>, ONR<sup>11</sup>R<sup>12</sup>, N-linked

heterocyclyl or O-(N-linked heterocyclyl), where the

heterocyclyl radical of the two last-mentioned substituents

may be partially or fully halogenated and/or may carry one to

three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkynylcarbonyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenyloxycarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkynyloxycarbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkynylaminocarbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-C<sub>1</sub>-C<sub>6</sub>-alkyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl or N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl, where

the above-mentioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups: cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-

alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;  
 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl, heterocyclylcarbonyl, phenoxycarbonyl, heterocyclyloxycarbonyl, phenoxythiocarbonyl, heterocyclyloxythiocarbonyl, phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, heterocyclyloxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, phenylaminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(phenyl)aminocarbonyl, heterocyclylaminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(heterocyclyl)aminocarbonyl, phenyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl or heterocyclyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, where the phenyl and the heterocyclyl radical of the 20 last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals: nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-halogenalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>8</sup>, R<sup>9</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-haloalkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl) amino or di-(C<sub>1</sub>-C<sub>6</sub>-haloalkyl) amino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:  
 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl) amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl) amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl) aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy

or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenoxy, heterocycloxy, where the phenyl and the heterocyclyl radical of the last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-alkynyloxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonylamino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three radicals from the following group:

cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl or heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the phenyl or heterocyclyl radical of the four last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl;

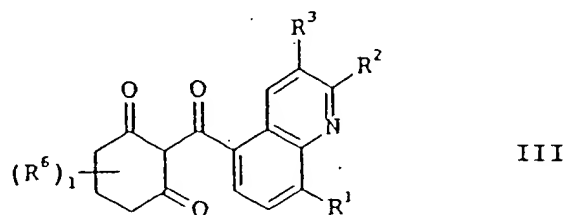
I is 0;

and their agriculturally useful salts.



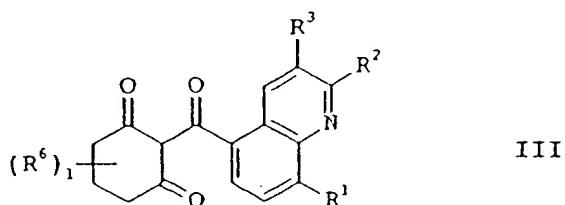
15. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 14, where
- $R^1$  is halogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -alkylthio, heterocycloxy or phenylthio, where the two last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the substituents mentioned below:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;
- $R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SOR^8$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$ ,  $OPSR^8R^9$ ,  $NR^{10}R^{11}$  or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy .
16. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 14, where
- $R^5$  is halogen,  $OR^7$ ,  $NR^{10}R^{11}$  or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy.
17. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 14, where
- $R^7$  is  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_{20}$ -alkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl,  $(C_1$ - $C_{20}$ -alkylthio)carbonyl, N,N-di- $(C_1$ - $C_6$ -alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy- $C_1$ - $C_6$ -alkylcarbonyl, where the phenyl radical of the three last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;
- $R^{10}$  is  $C_1$ - $C_6$ -alkyl or  $C_1$ - $C_6$ -alkoxy;
- $R^{11}$  is  $C_1$ - $C_6$ -alkyl.

18. A process for preparing compounds of the formula I as claimed in claim 14 where  $R^5 = \text{halogen}$ , which comprises reacting a cyclohexanedione derivative of the formula III,

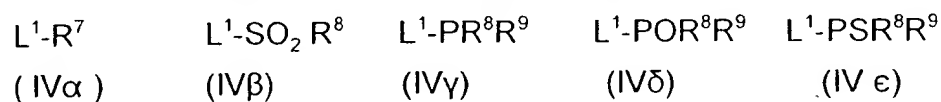


where the variables  $R^1$  to  $R^3$ , and I are each as defined in claim 14, with a halogenating agent.

19. A process for preparing compounds of the formula I as claimed in claim 14 where  $R^5 = OR^7$ ,  $OSO_2R^8$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$  or  $OPSR^8R^9$ , which comprises reacting a cyclohexanedione derivative of the formula III,

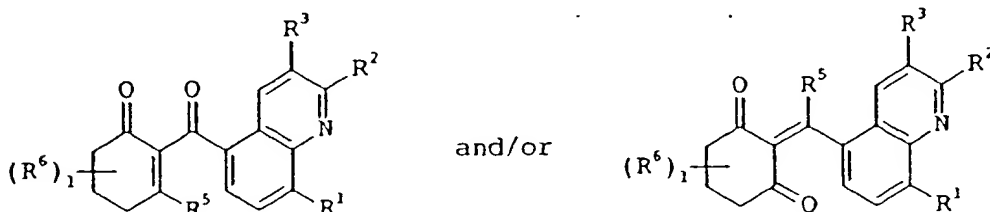


where the variables  $R^1$  to  $R^3$ , and I are each as defined in claim 14, with a compound of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\epsilon$ ,



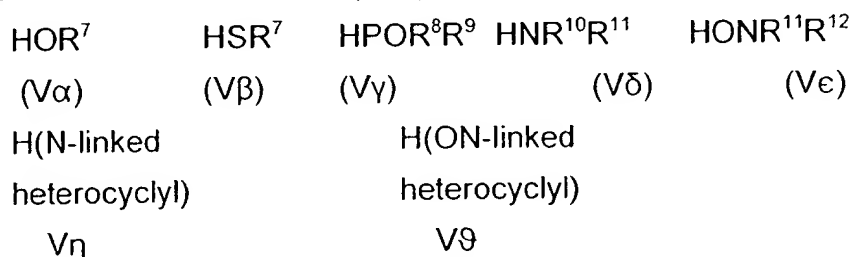
where the variables  $R^7$  to  $R^9$  are each as defined in claim 14 and  $L^1$  is a nucleophilically replaceable leaving group.

20. A process for preparing compounds of the formula I as claimed in claim 14 where  $R^5 = OR^7, SR^7, POR^8R^9, NR^{10}R^{11}, ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), which comprises reacting a compound of the formula I  $\alpha$  ( $\equiv$  I where  $R^5 = \text{halogen}, OSO_2R^8$ ),



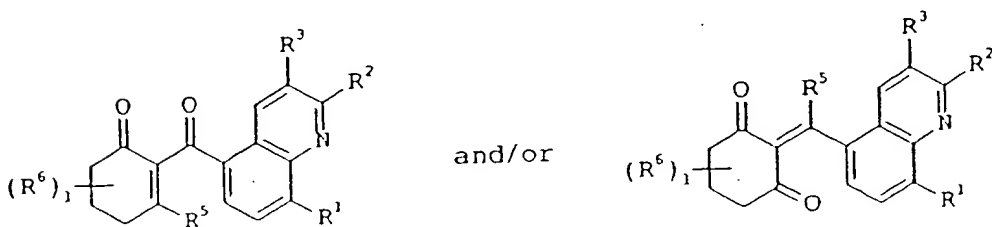
I where  $R^5 = \text{halogen or } OSO_2R^8$

where the variables  $R^1$  to  $R^3$ , and I are each as defined in claim 14, with a compound of the formula  $V\alpha, V\beta, V\gamma, V\delta, V\epsilon, V\eta, V\theta$ ,



where the variables  $R^7$  to  $R^{12}$  are each as defined in claim 14, if appropriate in the presence of a base.

21. A process for preparing compounds of the formula I as claimed in claim 14 where  $R^5 = SOR^8, SO_2R^8$ , which comprises reacting a compound of the formula I  $\beta$  ( $\equiv$  I where  $R^5 = SR^8$ ),



I where  $R^5 = SR^8$

where the variables  $R^1$  to  $R^5$ ,  $R^7$ ,  $R^8$  and  $I$  are each as defined in claim 14, with an oxidizing agent.

22. A composition, comprising a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 14 and auxiliaries which are customarily used for formulating crop protection agents.
23. A process for preparing compositions as claimed in claim 22, which comprises mixing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I and auxiliaries which are customarily used for formulating crop protection agents.
24. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 14 to act on plants, their habitat and/or on seeds.
25. The use of cyclohexenonequinolinoyl derivatives of the formula I or their agriculturally useful salts as claimed in claim 14 as herbicides.